

We claim:

1. A gear oil comprising:

- a) a base oil;
- b) a thermally stable phosphorus-containing anti-wear agent; and
- c) a metal-free sulfur-containing extreme-pressure agent;

wherein component (b) is present in an amount sufficient to provide from 100 to 350 ppm phosphorus to the formulated gear oil and wherein component (c) is present in an amount sufficient to provide at least 10,000 ppm sulfur to the formulated gear oil.

2. The gear oil according to claim 1, wherein said gear oil meets MIL-L-2105D (API GL-5) performance specifications.

3. The gear oil according to claim 1, wherein said gear oil has an L-60-1 carbon/varnish rating of at least 7.5 and an L-60-1 sludge rating of at least 9.4.

4. The gear oil according to claim 1, wherein said gear oil contains metal-containing additives in a total amount of no more than 2,000 ppm of metal.

5. The gear oil according to claim 1, wherein said gear oil contains metal-containing additives in a total amount of no more than 500 ppm of metal.

6. The gear oil according to claim 1, wherein said gear oil contains metal-containing additives in a total amount of from zero to about 25 ppm of metal.

7. The gear oil according to claim 1, wherein said gear oil is essentially devoid of ashless dispersants, dispersant viscosity index improvers, and dispersant pour point depressants.
8. The gear oil according to claim 1, wherein the base oil has a viscosity in the range of SAE 50 to SAE 250.
9. The gear oil according to claim 1, wherein the base oil has a viscosity in the range of SAE 70W to SAE 140.
10. The gear oil according to claim 1, wherein the thermally stable phosphorus-containing anti-wear agent is selected from the group consisting of oil-soluble amine salts of a phosphoric ester, and reaction products of dicyclopentadiene and thiophosphoric acid.
11. The gear oil according to claim 1, wherein the metal-free sulfur-containing extreme-pressure agent comprises a sulfur-organic compound including a sulfur-containing species bound directly to carbon or to more sulfur.
12. The gear oil according to claim 1, wherein the metal-free sulfur-containing extreme-pressure agent is selected from the group consisting of sulfurized olefin, and polysulfide composed of one or more groups represented by the formula $R^6-S_x-R^7$ where R^6 and R^7 are hydrocarbyl groups each of which contains 3 to 18 carbon atoms and x is in the range of from 2 to 8.

13. A method of manufacturing gear oil comprising blending a base oil, a thermally stable phosphorus-containing anti-wear agent, and a metal-free sulfur-containing extreme-pressure agent in respective amounts effective that the thermally stable phosphorus-containing anti-wear agent is present in an amount sufficient to provide from 100 to 350 ppm phosphorus to the formulated gear oil and wherein the metal-free sulfur-containing extreme-pressure agent is present in an amount sufficient to provide at least 10,000 ppm sulfur to the formulated gear oil and wherein the formulated gear oil contains 350 ppm of phosphorus or less.
14. A method of lubricating an automotive gear comprising using as the lubricant for the automotive gear the gear oil of claim 1.
15. A method for reducing sludge production in a gearbox comprising placing a gear oil according to claim 1 in the gearbox.
16. A method for reducing sludge production in an axle comprising placing a gear oil according to claim 1 in the axle.
17. A method for reducing sludge production in an automotive manual transmission comprising using a gear oil according to claim 1.
18. A method for reducing carbon and varnish production in a gearbox comprising placing a gear oil according to claim 1 in the gearbox.

19. A method for reducing carbon and varnish production in an axle comprising placing a gear oil according to claim 1 in the axle.
20. A method for lubricating the driveline of a motor vehicle in which said driveline comprises an automotive manual transmission located in a first housing adapted to hold fluid lubricant for the transmission, and differential axle gearing located in a second housing adapted to hold fluid lubricant, in which the method comprises introducing the gear oil according to claim 1 into both the first and second housings, and sealing both housings effective to retain the fluid lubricant in the first and second housings during ensuing operation of said vehicle.
21. An automotive manual transmission comprising a gear lubricated according to the method of claim 14.
22. A lubed gear box comprising a gear lubricated according to the method of claim 14.
23. A vehicle comprising a lubed gear box according to claim 22.